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Accuracy in HIV rapid testing among laboratory and non-laboratory personnel in Zambia: Observations from the National HIV proficiency testing system

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Background: Studies evaluating accuracy in HIV testing in high HIV prevalence countries remain limited. This study aimed to assess the overall accuracy level and factors associated with accuracy in HIV rapid testing in Zambia.

Methods & Materials: Accuracy was investigated among rural and urban HIV testing sites participating in two annual national HIV proficiency testing (PT) exercises conducted in 2009 (PT1; n = 282) and 2010 (PT2; n = 488). Testers included lay counselors, nurses, laboratory personnel and others. PT panels consisted of five serum samples conditioned into dry tube specimens (DTS) issued to testing sites by the national reference laboratory (NRL). Individual test site accuracy level was assessed by comparison of reported results to the expected PT panel results. Non-parametric rank tests and multiple linear regression models were used to assess variation in accuracy between tester groups and to examine factors associated with accuracy respectively.

Results: The overall accuracy level was 93.1% and 96.9% in PT1 and PT2 respectively. Differences in accuracy were seen between the tester groups in the first exercise in 2009, with laboratory personnel being more accurate than non-laboratory personnel, while in 2010 no differences were seen. Comparing the two exercises, an improvement in accuracy level was seen among all non-laboratory tester groups, i.e. lay counselors (96.5% from 89.9%), nurses (96.1% from 93.5%) and others (98.5% from 95.0%), while performance remained stable among laboratory personnel (98.7% vs 98.7%). In both PT exercises, lay counselors and nurses had more difficulties interpreting results, with more occurrences of false negative, false positive and indeterminate results. Adherence to the national HIV testing algorithm and having received the standard HIV rapid testing training were associated with accuracy.

Conclusion: The study shows an improvement in accuracy overall and particularly among lay counselors from the first PT exercise to the next. Average number of incorrect test results per 1000 tests performed was reduced from 69 to 31. Further improvement is needed however, and the national HIV proficiency testing system seems to be an important tool in this regard which should be continued and needs to be urgently strengthened.

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Feasibility of a targeted, very early infant HIV diagnosis algorithm in a resource-limited setting

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Background: Current WHO guidelines recommend virological testing for HIV infection in exposed infants at 4-6 weeks of age. Recent compelling evidence, however, indicates that earlier diagnosis and treatment of infant HIV infection can improve outcomes. In addition, very early treatment (within 48-72 hours of birth) could result in functional cure of HIV infection, as described for the "Mississippi baby".

Early therapy provision is dependent on early diagnosis. However, as the average transmission rate is low, universal testing at birth and at later time points would increase costs. A feasible approach for resource limited settings is targeted early postnatal diagnosis in infants at high risk of intra-uterine infection.

Methods & Materials: Mothers, at high risk of transmitting HIV, seen at Tygerberg Hospital in Cape Town are identified in the intra- or early postpartum period. Screening is performed once per day by one research nurse using five criteria to define high-risk mothers, namely first diagnosis of HIV infection during labour, exposure to antiretroviral prophylaxis or therapy for less than 4 weeks, mothers who defaulted prophylaxis or therapy, a viral load of > 1000 copies/ml in the 8 weeks preceding delivery or delivery of a premature or small-for-gestational age infant. Samples for virological testing are taken from infants as early as possible after recruitment for routine HIV PCR at an affiliated laboratory, operating for 9 hours per day on weekdays only.

Results: To date, 35 patients have been recruited over 17 weeks. The median time from birth to sample collection was 44.8 hours (interquartile range, 24 – 56 hours) and 65.9 hours to laboratory diagnosis (interquartile range, 51.2 – 76.9 hours). Two of 35 infants were identified as HIV infected.

Conclusion: Our preliminary experience confirms the feasibility of expanding diagnostic algorithms to detect very early HIV infection with minimal additional resources. Considering the close proximity of laboratories to academic hospitals, a further 24 hour delay is expected when expanding this approach to peripheral health facilities. Thus, HIV diagnostic results from high-risk infants could be available within 96 hours of birth in peripheral, resource-limited settings, which is a significant improvement compared to current standard of care.

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